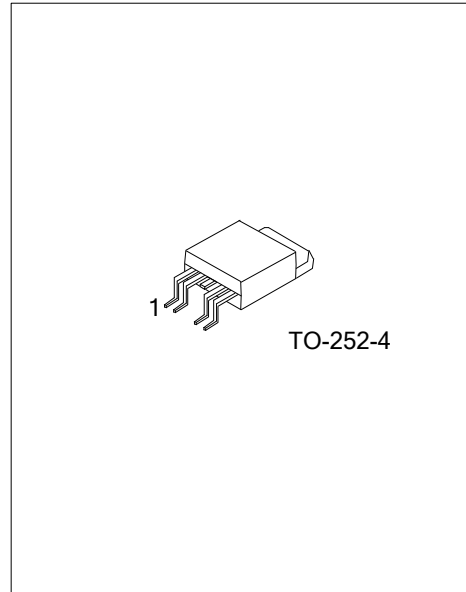




**N AND P-CHANNEL
ENHANCEMENT MODE FIELD
EFFECT TRANSISTOR**



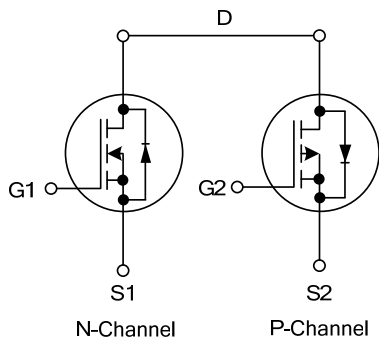
■ **DESCRIPTION**

The UTC **22NP04** is an N and P-channel enhancement mode field effect transistor, it uses UTC's advanced technology to provide the customers with a minimum on-state resistance, high switching speed and low gate charge.

■ **FEATURES**

- * N-channel:
24A, 40V, $R_{DS(on)} < 33\ m\Omega$ @ $V_{GS}=7.0V, I_D=7A$
24A, 40V, $R_{DS(on)} < 30\ m\Omega$ @ $V_{GS}=10V, I_D=10A$
- * P-channel:
-19A, -40V, $R_{DS(on)} < 40\ m\Omega$ @ $V_{GS}=7.0V, I_D=-5A$
-19A, -40V, $R_{DS(on)} < 35\ m\Omega$ @ $V_{GS}=-10V, I_D=-7A$
- * High switching speed
- * Low gate charge

■ **SYMBOL**



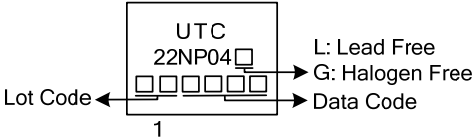
■ **ORDERING INFORMATION**

Ordering Number		Package	Pin Assignment					Packing
Lead Free	Halogen Free		1	2	3	4	5	
22NP04L-TN4-R	22NP04G-TN4-R	TO-252-4	S1	G1	D	S2	G2	Tape Reel

Note: Pin Assignment: G: Gate D: Drain S: Source

<p>22NP04L-TN4-T</p> <p>(1)Packing Type (2)Package Type (3)Green Package</p>	<p>(1) R: Tape Reel (2) TN4: TO-252-4 (3) L: Lead Free, G: Halogen Free and Lead Free</p>
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MARKING



■ ABSOLUTE MAXIMUM RATINGS ($T_C=25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS		UNIT	
			N-channel	P-channel		
Drain-Source Voltage		V_{DSS}	40	-40	V	
Gate-Source Voltage		V_{GSS}	± 20	± 20	V	
Drain Current	Continuous	I_D	$T_C=25^\circ\text{C}$	24	-19	A
			$T_C=70$	19	-15	A
	Pulsed (Note 1)	I_{DM}	60	-60	A	
Power Dissipation	$T_C=25^\circ\text{C}$	P_D	20.8		W	
	$T_C=70$		13.3		W	
Junction Temperature		T_J	-55 ~ +150		$^\circ\text{C}$	
Storage Temperature		T_{STG}	-55 ~ +150		$^\circ\text{C}$	

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ THERMAL CHARACTERISTICS

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Case	θ_{JC}	6	$^\circ\text{C}/\text{W}$
Junction to Ambient	θ_{JA}	42	$^\circ\text{C}/\text{W}$

Note: Pulse width limited by maximum junction temperature.

■ ELECTRICAL CHARACTERISTICS ($T_c=25^\circ\text{C}$, unless otherwise specified)

N-channel

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	40			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=32\text{V}$, $V_{GS}=0\text{V}$			1	μA
		$V_{DS}=30\text{V}$, $V_{GS}=0\text{V}$, $T_J=55^\circ\text{C}$			10	μA
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=+20\text{V}$, $V_{DS}=0\text{V}$			+100	nA
		$V_{GS}=-20\text{V}$, $V_{DS}=0\text{V}$			-100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	1.6	2.0	3.0	V
Static Drain-Source On-State Resistance (Note 1)	$R_{DS(ON)}$	$V_{GS}=7.0\text{V}$, $I_D=7\text{A}$			33	m Ω
		$V_{GS}=10\text{V}$, $I_D=10\text{A}$			30	m Ω
Forward Transconductance (Note 1)	g_{FS}	$V_{DS}=10\text{V}$, $I_D=10\text{A}$		25		S
On-State Drain Current (Note 1)	$I_{D(ON)}$	$V_{GS}=10\text{V}$, $V_{DS}=5\text{V}$	60			A
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{GS}=0\text{V}$, $V_{DS}=25\text{V}$, $f=1.0\text{MHz}$		765		pF
Output Capacitance	C_{OSS}			90		pF
Reverse Transfer Capacitance	C_{RSS}			75		pF
SWITCHING PARAMETERS						
Total Gate Charge (Note 2)	Q_G	$V_{GS}=10\text{V}$, $V_{DS}=30V_{(BR)DSS}$, $I_D=1\text{A}$, $I_G=100\mu\text{A}$		80		nC
Gate to Source Charge Note 2)	Q_{GS}			5		nC
Gate to Drain Charge Note 2)	Q_{GD}			7.5		nC
Turn-ON Delay Time (Note 2)	$t_{D(ON)}$	$V_{DS}=30\text{V}$, $V_{GS}=10\text{V}$, $I_D=0.5\text{A}$, $R_G=25\Omega$		44		ns
Rise Time (Note 2)	t_R			65		ns
Turn-OFF Delay Time (Note 2)	$t_{D(OFF)}$			330		ns
Fall-Time (Note 2)	t_F			155		ns
SOURCE TO DRAIN DIODE SPECIFICATIONS						
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	$I_F=10\text{A}$, $V_{GS}=0\text{V}$			1.2	
Body Diode Reverse Recovery Time	t_{RR}	$I_F=10\text{A}$, $dI_F/dt=100\text{A}/\mu\text{s}$		60		ns
Body Diode Reverse Recovery Charge	Q_{RR}			43		nC

■ ELECTRICAL CHARACTERISTICS (Cont.)

P-channel

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D = -250\mu A, V_{GS} = 0V$	-40			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS} = -32V, V_{GS} = 0V$			-1	μA
		$V_{DS} = -30V, V_{GS} = 0V, T_J = 55^\circ C$			-10	μA
Gate-Source Leakage Current	Forward	I_{GSS}				nA
	Reverse					
		$V_{GS} = -20V, V_{DS} = 0V$			-100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-1.6	-2.0	-3.0	V
Static Drain-Source On-State Resistance (Note 1)	$R_{DS(ON)}$	$V_{GS} = -7.0V, I_D = -5A$			40	m Ω
		$V_{GS} = -10V, I_D = -7A$			35	m Ω
Forward Transconductance (Note 1)	g_{FS}	$V_{DS} = -10V, I_D = -7A$		18		S
On-State Drain Current (Note 1)	$I_{D(ON)}$	$V_{GS} = -10V, V_{DS} = -5V$	-60			A
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{GS} = 0V, V_{DS} = -25V, f = 1.0MHz$		930		pF
Output Capacitance	C_{OSS}			155		pF
Reverse Transfer Capacitance	C_{RSS}			130		pF
SWITCHING PARAMETERS						
Total Gate Charge (Note 2)	Q_G	$V_{GS} = -10V, V_{DS} = -30V_{(BR)DSS}, I_D = -1A, I_G = -100\mu A$		20		nC
Gate to Source Charge Note 2)	Q_{GS}			3.2		nC
Gate to Drain Charge Note 2)	Q_{GD}			2.7		nC
Turn-ON Delay Time (Note 2)	$t_{D(ON)}$	$V_{DS} = -30V, V_{GS} = -10V, I_D = -0.5A, R_G = 25\Omega$		60		ns
Rise Time (Note 2)	t_R			92		ns
Turn-OFF Delay Time (Note 2)	$t_{D(OFF)}$			800		ns
Fall-Time (Note 2)	t_F			400		ns
SOURCE TO DRAIN DIODE SPECIFICATIONS						
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	$I_F = -7A, V_{GS} = 0V$			-1.2	
Body Diode Reverse Recovery Time	t_{RR}	$I_F = -7A, di_F/dt = 100A/\mu s$		80		ns
Body Diode Reverse Recovery Charge	Q_{RR}			75		nC

Notes: 1. Pulse test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.

2. Independent of operating temperature.

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